

NOAA - Wide IT Principles

META PRINCIPLES:

M.1. IT Decisions Will Be Driven by Total Business Worth to NOAA

M.2. NOAA will make use of vendor-neutral (e.g., TCP/IP) and vendor-specific (e.g., Microsoft Windows) standards, where practical, to develop interoperable and open systems.

M.3. Security is essential and appropriate security will be provided for NOAA networks, servers, computers, and data/information.

M.4. Electronic Accessibility of Services and Products will be provided in accordance with Federal law for persons with disabilities.

M.5. Training is essential to retain personnel, and to make effective use of IT systems and resources NOAA will attempt to coordinate the provision of state-of-the-art training anytime and anywhere through the use of Internet and other electronic means.

M.6. The IT Architecture will be regularly updated to reflect changes in strategic goals, business needs, and technology.

BUSINESS PROCESS PRINCIPLES (NOAA's Mission)

B.1. Accomplishment of NOAA's mission is critically dependent on a sound IT infrastructure.

B.2. Business Processes will be optimized through appropriate use of digital workflow technologies.

B.3. Appropriate Access to resources will be provided independently of location or organization.

B.4. Partnerships with constituents and collaborators in academia, industry and other agencies will be fostered and encouraged.

DATA PRINCIPLES

D.1. Data Is a Corporate Resource and will be managed effectively and efficiently, made available, and archived in accordance with Federal Regulations.

D.2. Metadata will be developed and maintained.

D.3. Data will be entered and captured only once.

D.4. Data will be kept Separate from Applications.

D.5. Data will be Online to the extent feasible and appropriate.

APPLICATION PRINCIPLES

A.1. User requirements will drive application development.

A.2. Process Re-engineering or Simplification will be evaluated before buying or developing applications for a process.

A.3. Off-the-Shelf Software will be used in preference to home-grown solutions when it can meet requirements.

A.4. Application development will use proven software engineering methodologies to develop, re-engineer, maintain and implement applications.

A.5. Security, networking, scalability, modularity and platform independence will be critical design elements.

A.6. Documentation of all applications will be provided and maintained.

TECHNOLOGY PRINCIPLES

T.1. NOAA will provide a common network environment with adequate bandwidth, using a standard set of protocols, to support NOAA's network services.

T.2. The Internet/Web will be a key element in acquiring, transmitting, and sharing NOAA data and information. NOAA seeks standard and easier ways to access increasingly complex technologies and information.

T.3. Messaging is critical to NOAA's day-to-day business operations and must be reliable, accessible, secure, must provide electronic forms for collaboration, and must provide a robust corporate directory.

T.4. Technologies will be chosen to enhance mission capabilities, to improve customer service, and to support scalability, portability, operability, compatibility and evolutionary changes.

T.5. Emerging technologies will be evaluated in pilot projects before using them in critical and/or operational systems. Technologies may be adopted if proven effective and efficient in pilot demonstrations.

T.6. High Performance Computing will be used to meet NOAA's requirements for increased high-end computing resources for higher resolution models and for improved representation of the physics, chemistry, and biology of environmental systems, and to help manage and process the rapidly increasing amounts of data available and necessary to run the models.

META PRINCIPLES

M.1. IT Decisions Will Be Driven by Total Business Worth to NOAA

Rationale:

In making IT decisions, NOAA shall ascertain what is the best business choice for NOAA. Factors that will be considered include: optimal support for NOAA's mission, Total Cost of Ownership (TCO), overall operational efficiency, costs of switching vendors, cost of technical refreshment, and best technical alternative. IT decisions must be made such that Total Cost of Ownership (TCO) is minimized and customer service is improved and not diminished. TCO includes overall costs of acquisition, operations, usage, maintenance and disposal. IT decisions must take into consideration how NOAA's customers benefit and NOAA's ability to carry out its mission is enhanced, and shall not be made on acquisition cost alone. Personnel costs are rising while hardware and other IT costs are declining; NOAA would prefer to make extra investments in IT when those investments can significantly reduce overall mission-related costs. Least cost acquisition (low bidder) does not necessarily provide best overall business value.

Implications:

Apply Principle	Do Not Apply Principle
IT Investments result in both high financial efficiency and business effectiveness	NOAA IT not optimized to meet customer requirements
Enables rapid change in business processes and in the applications and technical infrastructure that enables them	Added burden and cost to NOAA's customers
NOAA productivity is enhanced to meet its missions	
Improved customer service	

M.2. NOAA will make use of vendor-neutral (e.g., TCP/IP) and vendor-specific (e.g., Microsoft Windows) standards to develop interoperable and open systems, where practical.

Rationale:

To achieve the IT Architecture, NOAA requires a greater degree of interoperability throughout the enterprise. The necessary level of interoperability requires the adoption of and conformance to industry accepted standards, uniform Products protocols, and best practices that will facilitate information exchange. The standards-and protocols selected for enterprise use, must meet the

needs of the entire NOAA community and be flexible enough to change as IT changes.

Industry accepted standards can be either a vendor-neutral and vendor-specific. The terms 'vendor-neutral' and 'vendor-specific' are used in place of De Jure or De Facto standards to reflect the current state of standards definition and development.

Open systems standards provide the best means of developing applications such that both the design and system implementation are independent of a specific vendor's hardware or software platforms. Products and technologies that are considered compliant with open systems standards use interface specifications that are readily available to all suppliers, service providers, and users, and are revised only with timely notice and public process. Open systems standards allow for continued access to technological innovation supported by many customers and a broad IT industry base. In our approach, however, it is axiomatic that interoperability is more important than openness.

Open, vendor-neutral systems standards provide flexibility and consistency that will allow NOAA to respond more quickly to changing business requirements. Vendor-neutral systems support economic and implementation flexibility. Vendor-neutral systems also will protect NOAA against unexpected changes in vendor strategies and capabilities.

Implications:

Apply Principle	Do Not Apply Principle
Promotes interoperability	Absence of standards will increase the diversity of IT solutions and make it more difficult to provide interoperable solutions.
Employs standards that ultimately expand our choices of technology solutions, thereby lessening our dependence on single vendor solutions	No methodology or criteria available for identifying or selecting products when no standards have been established
Provides IT solutions that are less susceptible to obsolescence	Locks NOAA into one vendor's solution
Facilitates adaption of technology solutions to satisfy changing business requirements while lowering the total cost of IT ownership	
Takes advantage of lower costs resulting from vendor competition to differentiate their products within the standards framework	

M.3. Security is essential and appropriate security will be provided for NOAA networks, servers, computers, and data/information.

Rationale:

Security is the responsibility of every NOAA employee, agent, and business partner. All IT resources processing, storing, transmitting, receiving or otherwise having access to corporate information will be secured and protected adequately to ensure the confidentiality and integrity of the information being processed. Without an integrated approach to security implementation, NOAA cannot ensure that its policies, procedures, and technologies adequately protect the enterprise against known security threats. However, as a practical matter, the cost of implementing adequate security safeguards should not exceed the liability risk, or create unnecessary barriers to information access by authorized users.

Security planning must be woven throughout the Information Technology Architecture in order to ensure that IT applications, systems, infrastructure, and services comply with all requirements and are secure, dependable and cost-effective. It is important that security policies and procedures at the NOAA level be flexible enough to allow the continued success of these missions while still providing a risk level commensurate with operation or mission critical needs, because NOAA is comprised of several organizations that have differing missions and IT requirements. Therefore, NOAA should provide its line organizations with guidelines and best practices at a corporate level that assist those organizations in implementing a comprehensive set of local security policies and procedures.

A NOAA security policy defines the overall framework for implementing and sustaining an efficient and cost-effective security effort. The policy establishes lines of authority, roles and responsibilities, and basic security principles and requirements. Security is both a management and personal issue. Without a complete and consistent application of policy and requirements, and without each NOAA staff member aware of their security responsibilities, technology will ultimately fail to protect sensitive government systems and information.

Federal law, regulatory mandates and directives require NOAA to implement appropriate administrative, technical and physical safeguards to ensure the security and confidentiality of sensitive data and information against unauthorized access and use. Some of security-related laws, policies and directives incumbent on all government agencies and bureaus are described. The Computer Security Act of 1987 (PL 100-235) and the Privacy Act of 1974 (PL 93-579) established some high-level guidance for all government systems that process or store sensitive unclassified information. OMB A-130 provides some baseline security requirements for all such systems and requires that all systems be approved for processing based on the adequacy of the safeguards. Presidential Decision Directive 63 (PDD-63) explains key elements of the Executive Branch's policy on critical infrastructure protection.

Implications:

Apply Principle	Do Not Apply Principle
NOAA will have a structure for implementing IT security policies and procedures that will lead to better overall coordination between organizations.	Coordination between NOAA organizations for IT security may be erratic.
NOAA will implement IT security at all organizational levels.	There will be no consistency between IT security policies and procedures between line organizations, which will make cooperation difficult.
NOAA systems will have more consistency in IT security policies and procedures between line organizations, which will lead to better cooperation.	No one takes responsibility for security of information and system.
Responsibility for information and system security is the enterprise and all people involved in the IT system' development, operation, usage and maintenance.	Information and system come vulnerable to attacks from within NOAA and from external forces.
NOAA information will be adequately protected, reliable and only be available to authorized entities.	Irreversible loss of critical information is possible.
Privacy information is protected.	Unauthorized access and use of NOAA information could lead to legal liabilities.
Information is appropriately protected.	Information is vulnerable to modification or loss.. Consequently, the reliability and integrity of NOAA information can not be trusted.
Networks are available when needed.	Networks may be unavailable when needed to support the mission of the organization.
Networks are appropriately protected to ensure that hackers are unable to compromise the networks and embarrass the organization.	Networks are vulnerable to hackers and embarrassing incidents may happen.

M.4. Electronic Accessibility of Services and Products will be provided in accordance with Federal law for persons with disabilities.

Rationale:

Section 508 of the Rehabilitation Act Amendments of 1998 requires that when Federal agencies

develop, procure, maintain, or use electronic and information technology, they must ensure that Federal employees with disabilities have access to and use of information and data that is comparable to that of Federal employees without disabilities, unless an undue burden would be imposed on the agency. Section 508 also requires that members of the public with disabilities must have access to and use of information and data that is comparable to that provided to members of the public who do not have disabilities, unless an undue burden would be imposed on the agency.

Implications:

Apply Principle	Do Not Apply Principle
NOAA will meet its legal requirements, make full use of its employees with disabilities, and provide its services and products to the broadest extent feasible. NOAA offices will have to review their IT development, procurement, etc. efforts, including their Home Pages, to provide access unless that would impose an undue burden on the office.	NOAA will fail to meet legal requirements and can be sued for this failure. NOAA will be limiting the public it serves and will not make full use of employees with disabilities.

M.5. Training is essential to retain personnel, and to make effective use of IT systems and resources NOAA will attempt to coordinate the provision of state-of-the-art training anytime and anywhere through the use of Internet and other electronic means.

Rationale:

This principle encourages that all NOAA employees be computer literate. In today's world computer literacy is no longer an option to accomplish one's job, it is mandatory in this age of Internet and network based applications. IT training makes full use of information and technology by enhancing knowledge and skills and meeting the diversity of special needs. Technical training and knowledge infusion will be essential for NOAA to remain a world-class scientific organization.

Annual System Administration, Data Base Administration and Network Management training is necessary for NOAA's professional IT staff so that these people can maintain their proficiency and stay current in a constantly changing IT environment.

Training for new systems and upgrades of installed systems is often overlooked in the implementation/upgrade of systems. The lack of adequate or sufficient training inhibits productivity and can adversely affect user regard for the systems. This principle will ensure the full value of new technology and processes is realized in the performance of work.

Training of personnel at all levels is an essential element in attaining improved operational efficiency and a greater level of organizational effectiveness. As new computer and communications technologies are introduced and deployed, all personnel should be trained in their use and operation. A heightened awareness of the benefits of these advanced technologies combined with comprehensive training should create new opportunities for organizational and technical innovation. Specialized support and administrative personnel should be re-trained in order to maintain these new systems , applications, and their associated technologies.

Implications:

Apply Principle	Do Not Apply Principle
NOAA Staff maintains or improves IT literacy competency	The full benefits of the technology investment will not be realized
The architecture itself should facilitate the delivery of training, including the use of Internet and distance-learning training and robust on-line help within each application system and operating environment	User frustration will increase
Helps to retain IT professionals by allowing them to stay up-to-date in their computer and networking skills and abilities.	
There will be an up-front cost in terms of time and money invested to ensure that staff are properly trained	
Each person will be able to develop and follow their own individualized developmental plan	

M.6. The IT Architecture will be regularly updated to reflect changes in strategic goals, business needs, and technology.

Rationale:

NOAA's capital planning and investment control process is based on its IT Enterprise Architecture and its transition from the current architecture to the target architecture in accordance with the Clinger-Cohen Act and Office of Management and Budget (OMB) Circular A-130. The IT Architecture will ensure that IT capital planning and investments are linked with NOAA's strategic goals and business needs. An effective IT Architecture guides the acquisition

of the technology needed to process the information the agency uses to accomplish its work. The Enterprise Architecture must be documented and provided to OMB as significant changes are incorporated.

Implications:

Apply Principle	Do Not Apply Principle
Comply with Clinger-Cohen Act and OMB Circular A-130 requirements.	Funding for IT Capital Investments is not approved.
Will help NOAA cope with change by incorporating new or proven technologies, enterprise-wide in a timely manner.	Fragmented enterprise-wide IT Architecture continues or re-occurs.
Results in faster migration to new technologies.	IT systems capabilities will become stagnant and obsolete.
Facilitates convergence of business strategy and technology strategy	
Management and governance processes need to be developed and policies need to be promulgated.	
Senior leadership must plan for and commit resources to this periodic review.	

BUSINESS PROCESS PRINCIPLES (NOAA's Mission)

B.1. Accomplishment of NOAA's mission is critically dependent on a sound IT infrastructure.

Rationale:

Rapid advances in Information Technology have already provided a solid basis for the effective accomplishment of NOAA's mission. A robust, high quality IT infrastructure that keeps pace with advances in information technology is crucial to accomplishment of NOAA's mission.

Implications:

Apply Principle	Do Not Apply Principle
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A robust and high quality IT infrastructure will support the timely, efficient and effective accomplishment of NOAA's mission.	NOAA will fail to utilize advances in IT and the accomplishment of NOAA's mission will be slower, more costly and less effective.
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B.2. Business Processes will be optimized through appropriate use of digital workflow technologies.

Rationale:

Digital workflow technologies offer the potential for major gains in productivity, providing services and products to the public and to employees in the quickest and most efficient manner. A paper flow is replaced by electronic transactions, data doesn't have to be re-entered at different stages in the process, etc. Processes that take weeks may be shortened to days or hours. Digital work flow technology has the potential for revolutionary impact on the way a program's business is done.

Implications:

Apply Principle	Do Not Apply Principle
NOAA's workflow processes should become more efficient and less costly. Program offices will review their processes to determine when digital workflow is affordable and effective.	Current paper and people-intensive workflows will continue, and NOAA will not realize the full potential impact of IT capabilities. NOAA will fail to meet goals for a digital government and digital department. On the positive side, the costs of ill-conceived or managed projects will be avoided.

B.3. Appropriate Access to resources will be provided independently of location or organization.

Rationale:

Limitations on access to IT resources potentially affect a number of aspects of operations. Employees may be limited in their ability to do their jobs while on travel or when at home. Remote office locations may not be able to use the home office's resources. Employees may not be able to access high-performance computers that may be needed to run their models or other applications. IT investments may not be achieving their maximum value because of locational or

organizational limitations on their use. This does not mean that everyone should have access to all resources; there can be many reasons why such access may not be appropriate. But as technology evolves to make remote access to resources easier, access issues should always be considered to determine the maximum access that is feasible and appropriate.

Implications:

Apply Principle	Do Not Apply Principle
NOAA will maximize the effectiveness of its employees and IT resources by making those IT resources more available. Program offices will review the technological options for making their IT resources accessible regardless of location or organization, identify what forms of access will provide maximum net benefits to the organization and NOAA at large, and implement such access methods when feasible.	Employees will be restricted in where and when they can perform work, and may not have access to resources that would enable them to perform more effectively. Expensive IT resources may sit idle when off-site personnel need them.

B.4. Partnerships with constituents and collaborators in academia, industry, and other agencies will be fostered and encouraged.

Rationale:

Many organizations outside of NOAA share interests with NOAA's programs. These include academic institutions conducting research into areas related to NOAA programs, other agencies that have management or regulatory responsibilities related to similar NOAA activities, and companies that can help NOAA deliver products to the public through cooperative research and development agreements (CRADAs). NOAA wants to make the best use of cooperation with these organizations.

Implications:

Apply Principle	Do Not Apply Principle
Partnerships will improve the products or services provided to the public by making use of knowledge and skills outside the agency. Duplicate efforts may be avoided, allowing resources to be used more effectively to achieve goals. The organizations and persons involved may be more supportive of the products and NOAA's programs.	Activities will take place in isolation. This may just be less efficient and economical, but may also produce products and services of lower quality, result in regulations that conflict with those of other agencies, or lower the level of acceptance by outside persons and organizations by not involving them in the process.

DATA PRINCIPLES

D.1. Data Is a Corporate Resource and will be managed effectively and efficiently, made available, and archived in accordance with Federal Regulations.

Rationale:

NOAA data and information must be preserved and protected in order to support NOAA's Strategic Initiatives, as well as, supporting NOAA's diversified customer base as defined by each LO requirement and/or policy statement. Without a defined requirement and/or policy statement regarding NOAA's data and information NOAA will ultimately fail to meet strategic initiative objectives and/or customer demands.

A data and information corporate asset policy must be in place as guidance to the development of any individual archive and access system policy statements specific to the individual system. The system policy statement must focus on NOAA's mission and address requirements for data integrity, availability, confidentiality and preservation.

Corporate asset planning in regard to archive and access must follow IT architecture guidelines in order to ensure these assets comply with IT applications, systems, infrastructure and services.

Implications:

Apply Principle	Do Not Apply Principle
Each LO is responsible for defining data and information as a NOAA corporate asset.	No one takes responsibility for defining data and information as NOAA corporate asset.

Apply Principle	Do Not Apply Principle
Each LO is responsible for preserving and protecting NOAA's corporate assets.	No one takes responsibility for preserving and protecting NOAA's corporate assets. NOAA's strategic initiative objectives and/or customer demands will not be met.
Confidential information is protected.	Information is released to anyone.
Data and information are available for access.	Data and information are not available for access.
Data and information are archived.	Loss of critical data and information - a corporate asset is possible.

D.2. Metadata will be developed and maintained.

Rationale:

Metadata or "data about data" describe the content, quality, condition, and other characteristics of data. In essence, metadata answer the questions of who, what, when, where, why, and how about every facet of the data that are being documented. Federal Standards should be followed where applicable. Metadata allow users to better understand and evaluate the data sets.

Implications:

Apply Principle	Do Not Apply Principle
NOAA's data will be more fully understood and can be properly evaluated by users.	NOAA's data will not be as usable, or will be subject to misuse, because key aspects of its organization and background will not be understood.

D.3. Data will be entered and captured only once.

Rationale:

Capturing and entering data multiple times increases costs, increases the chances for entry errors, places additional burden on the people providing the data, and can delay a business action or data availability. IT should be used to access data that already exists in the business process, program, or in NOAA, rather than to collect or enter the data again, unless the purpose is to update the information. IT should also be used in business processes (see Principle B.2.) to transfer

electronic data so that different offices in the process don't each re-enter data for their step in the process.

Implications:

Apply Principle	Do Not Apply Principle
NOAA should have more consistent and reliable data while reducing the burden of providing or entering the data.	NOAA will enter and maintain multiple copies of data, wasting human and IT resources while increasing the chances of errors, and have less efficient processes.

D.4. Data will be kept Separate from Applications.

Rationale:

Original source data cannot be directly acted on by any software application. There is middleware that would first provide authentication, security, verification of the operation, and ensure data integrity. Examples are administrative and financial data, Employee Express and a Bank ATM machine. For environmental and scientific observation data, the original source data cannot be changed after initial data quality control has been performed.

NOAA must ensure that its data is available across systems. To do this, the data must be separate from the application programs. Also, effective applications must be able to separate data available to most users from more-specific information available only to a few users.

Finally, to reduce current, and avoid future, stovepiped "islands of information" NOAA needs to make separate its critical applications from its data sources. NOAA needs to consolidate data under common structures and develop data base architectures for key accounts.

System designers should not assume that data is for one use only. Data may have future uses.

Implications

Apply Principle	Do Not Apply Principle
Scientific observation data are made available only as read-only.	For environmental data, changes to source observation data would result in loss of original source data that could not be retrieved or reverse extrapolated..

Apply Principle	Do Not Apply Principle
For environmental data, original data sets can be improved and refined as IT platforms and applications are improved and as new IT methodologies and tools are discovered.	In procuring COTS software, consider the openness of the package so that data can be used later by other applications.
Need to separate the data from the logical design of the application.	
Applications need to be developed in such a way that it presumes to know where data is kept and how it is stored.	
Need data access component or application interface that knows where data is kept and how it is stored. Application knows how to access the interface.	
The application does not own the interfaces	
Data is maintained in such a way that NOAA has the ability to change data storage techniques and vendors independent of applications.	
The applications and data that comprise the solutions will be designed so that they can be maintained independently of each other and the underlying technology.	
Integrated and shared use of information and systems will allow and support the decentralization of NOAA information.	

D.5. Data will be Online to the extent feasible and appropriate.

Rationale:

The Government Paperwork Elimination Act and the December 17, 1999 Presidential Memorandum on “Electronic Government” both direct agencies to make their transactions with the public, with other agencies, and internally as electronic as feasible and appropriate. Having data online obviously is the most accessible way to offer data to the public and other government offices. NOAA has been a leader in the use of the Internet to offer data to people. When having data online is not feasible, program offices should consider making available electronically in some other way.

Program offices need to examine any data holding it has that are not online and evaluate whether it can and should be made available in this way. If so, it should implement this approach as quickly as possible, recognizing funding limitations. The application of this principle will maximize the amount of data NOAA offers to all users.

Implications:

Apply Principle	Do Not Apply Principle
NOAA will be providing immediate access to the maximum amount of its data, consistent with appropriateness and affordability. Program offices will examine any data holdings that are not online and evaluate whether the data can and should be made available in this way.	Users will not be able to quickly access as much data and Federal goals will not be met. Providing data in other forms may be more costly if people are directly involved, especially as storage and access costs drop.

APPLICATION PRINCIPLES

A.1. User requirements will drive application development.

Rationale:

Users are critical stakeholders whose involvement is imperative to the success of new applications and systems. Unless the application easily provides what it is that users need it will be marginal at best.

Implications:

Apply Principle	Do Not Apply Principle
Users commit to written set of requirements.	Customers do not participate in design reviews and are incapable or unwilling to do so.
Application developers understand customer requirements.	Cost and schedules overrun.
Programmer shows improved efficiency in developing application.	Communication with customer is slow and infrequent.
Less Rework.	

A.2. Process Re-engineering or Simplification will be evaluated before buying or developing applications for a process.

Rationale:

Technology often makes it possible to do work in a new and more efficient way. Opportunities for major process improvements may be missed if the application of technology is limited to the automation of current process.

Implications:

Apply Principle	Do Not Apply Principle
Applying the principle can maximize the value of IT to the business process, and make those processes more efficient. Prior to buying or developing an application for a process, a program office will need to take a close look at the current process, the capabilities of technology, the long-term costs of doing business, etc., to determine what the application should really be asked to do. The question is not just how the process is now done, but how it can and should be done.	Program offices will not maximize the value of its IT investments, and NOAA will not realize the process improvements that may be possible. On the positive side, the costs of ill-conceived or managed projects will be avoided.

A.3. Off-the-Shelf Software will be used in preference to home-grown solutions when it can meet requirements.

Rationale:

The selection and use of Commercial and Government Off-the-Shelf technology (COTS and GOTS), is preferable to new development as specified by the Clinger-Cohen Act and reenforced by OMB regulations. The use of COTS and GOTS products in a principles and standards-based environment is potentially more cost-effective and efficient than other approaches because of reduced development, implementation, maintenance, and training costs. The Clinger-Cohen Act stipulates that software engineering methodologies are to be modular or phased, with usable end products. A modular or phased approach can reduce the risk of failure through independence, isolate failures, accept requirements modifications, and support evolutionary design. It is not cost effective to duplicate common system service functions, nor do limited resources allow for duplicate efforts. A common data management function supports the principle of corporate data. The business of the NOAA depends on computer power and will benefit from scalable architectures and parallel processing.

Buying existing commercial services may provide the best value solution for parts of work processes. COTS and GOTS products can range in size and functionality from component functions that “plug” into the existing systems infrastructure, to entire application systems, to enterprise resource systems (e.g., products like SAP, PeopleSoft, etc.). Industry trends toward increased software development costs are likely to continue instead of abate, and the appropriate use of COTS and GOTS products is one way to acquire needed IT capabilities in a cost-effective manner. Where using existing components is both possible and feasible, it is no longer acceptable for Federal agencies to specify, build, and maintain comparable custom solutions.

Implications:

Apply Principle	Do Not Apply Principle
Will help NOAA implement changes in a timely manner.	Life cycle costs may be greater than initial cost to implement COTS or GOTS solution.
Investments can be made in IT skills, tools, and technology instead of application development costs	Results in extensive systems development resources
Resources will be required to support the development of business case analyses in support of this decision making process.	Continued tendency to build custom applications
Implementing COTS/GOTS technology without adequately aligning business processes to the technology can result in excessive customization costs	Enterprise-wide solutions might not be implemented, causing an increase of management, maintenance and resource costs.
A threshold(s) needs to be established to determine when a COTS/GOTS application is not appropriate. The current rule of thumb is if a COTS/GOTS application requires more than a 20% modification to meet the requirements, development is preferred.	In some instances, a COTS/GOTS technology may not be selected even though it meets more than 80% of the requirements. Choosing COTS/GOTS technologies requires caution, since many vendors are new, products may be unproven, solutions may be complex, and open standards are still evolving.
A review process must exist that offers the opportunity for approval of decisions to develop rather than purchase a COTS or GOTS application.	

A.4. Application development will use proven software engineering methodologies to develop, re-engineer, maintain and implement applications.

Rationale:

NOAA will employ a flexible and scalable methodology for all application development projects, including new systems, conversions, redesigns, and maintenance. Application development methodologies will follow industry best practices and will be based on a four part strategy:

- 1) Avoid classic software engineering mistakes
- 2) Apply software development fundamentals
- 3) Manage risks to avoid catastrophic setbacks
- 4) Apply schedule-oriented practices such as, speed-oriented, visibility-oriented and schedule-risk-oriented practices. (These practices are discussed in “Rapid Development” by Steve McConnell, Microsoft Press, 1996.)

This methodology ensures that requirements for user access and communications, existing IT infrastructure, and system administration and support will be adequately addressed.

Implications:

Apply Principle	Do Not Apply Principle
Improves development speed. Software is developed faster.	Software products that do not meet user requirements
Reduces schedule risk and avoids huge schedule overruns.	Less able to recover from change (personnel, requirements, programs, infrastructure, etc.)
Makes application development process more visible, dispelling the appearance of slow development.	Reduce ability for rapid analysis
Better quality and compatible systems	Duplication of efforts
Requires oversight and assigned responsibility	
Requires more meetings, coordination and training. Staffing and infrastructure resources are increased.	

A.5. Security, networking, scalability, modularity and platform independence will be critical design elements.

Rationale:

Appropriate application of security and use of networking are critical elements of effective use of IT today. Scalability, modularity and platform independence are critical elements of good programming practice in IT today. NOAA must adhere to these proven principles in it's application of IT.

Implications:

Apply Principle	Do Not Apply Principle
NOAA networks and applications are secure.	Due to insecure networks and/or applications, the integrity of NOAA's data and information will be compromised. NOAA could be greatly embarrassed by these breaches in security. Significant costs can be incurred in repairing security breaches.
NOAA networks will be utilized to maximize the effectiveness and efficiency of NOAA applications and data transmissions.	Without effective utilization of networks, NOAA will waste resources in the process of data transmissions.
NOAA IT solutions are scalable, modular and platform neutral. Components can be expanded and reused with ease.	NOAA IT solutions are not cost effective. Changes in scale or platform require expensive redesign or retooling. New development is done from scratch and similar solutions must be developed repeatedly for use within different applications.

A.6. Documentation of all applications will be provided and maintained.

Rationale:

Applications without documentation often become useless and typically take more IT resources to manage and support (and sometimes to rewrite) than applications that provide adequate documentation. Shared applications are to be documented allowing for subsequent code modification and code reusability.

Development of applications is costly. To facilitate reuse of code, it needs to be documented internally, i.e., embedded remarks describing the operation being carried out for each routine.

The Application Architecture mimics and supports business processes, and must change when business processes change. Changes occur more frequently in business processes than in the data required to support the business. Project teams must focus on the process that creates the data at least as much as they focus on the data itself. Application Architecture is as important as Data Architecture because data is a result of business processes.

Implications:

Apply Principle	Do Not Apply Principle
Able to use applications for longer period of time because the programs can stay current as business processes change.	Unable to update applications as business processes change.
Programmers are able to maintain and fix application long after original coding efforts are completed.	Reduced efficiency and greater rework to fix coding problems.
	Increased costs to reuse, maintain and update application code.

TECHNOLOGY PRINCIPLES

T.1. NOAA will provide a common network environment with adequate bandwidth, using a standard set of protocols, to support NOAA's network services.

Rationale:

NOAA networks form the communications infrastructure for the organization to share data, information and resources. Maintaining a homogenous, principles- and standards-based environment allows for an infrastructure that is interoperable, portable and scalable. Implementing a principles- and standards- based infrastructure will ensure increased connectivity between diverse computer systems throughout NOAA, providing end-users with improved access to needed applications and information. Additionally, if network components are interchangeable, NOAA can leverage existing resources and recycle system components throughout the organization.

The network infrastructure will be critical to implementing department-wide applications, such as CAMS, Digital Department initiatives, and any other enterprise-wide application. The network should provide value-added services separately from the processors attached to the network. The network infrastructure is critical in support of the enterprise messaging service (Netscape) and will be instrumental in the implementation of future collaboration activities within NOAA and the Department of Commerce. Network connectivity is essential for linking NOAA employees with each other and with their customers and partners. The communications and information sharing capabilities provided by networks are critical for empowering staff, improving productivity, and meeting customer needs.

A common network environment will provide the following business benefits:

- Easier and faster communications and access to data among staff, customers and partners

- Common access to all data sets, which is essential for NOAA personnel to share information and data
- Improved staff productivity and efficiency
- Better customer services to meet constituent needs
- Enhanced back-up services
- Cost savings from divestiture of non-compliant devices
- Support for scalability to meet future requirements
- Flexibility to conduct work from remote locations.

Implications:

Apply Principle	Do Not Apply Principle
A basic infrastructure is available to implement enterprise-wide applications	Applications will have to be tweaked and will may require additional and redundant components to ensure interoperability among the LO's
Network components are compatible and interchangeable minimizing conflicts and a single point of failure	Resolving connectivity problems requires greater coordination, takes longer, and results in greater costs to the organization
Integrated LAN/WAN/external network design is required. Network-based processors for network services need to be defined	Autonomous computing/network environments
Connectivity standards and a full set of communications facilities need to be defined	Can implement different networking approaches in different areas of organization
Network and telecommunications will be optimized at the NOAA level and not at the Line Office level.	NOAA systems will remain incompatible and data will not be easily shared among all of the LO's
All Line Offices must cooperate. If applied, NOAA will need to change the behaviors of the Line Offices.	May need to integrate different services at the workstation instead of through the network

Apply Principle	Do Not Apply Principle
Eliminates “redundant” efforts to provide connectivity among LO’s.	Common services provided by host processor
Reduced program and regional autonomy. No system is an “island”.	
Connectivity with customers/suppliers needs to be addressed. Application and system vendors must support interconnectivity. Products that do not meet standards cannot be considered.	
Integration of local and wide-area networks with external public data networks will provide connectivity with NOAA customers and partners.	
Security of directories and services need to be addressed.	
Additional system management services should be examined.	
Reduced operational and maintenance costs should result.	

T.2. The Internet/Web is a key element in acquiring, transmitting, and sharing NOAA data and information

Rationale:

The Internet and the Web are increasingly important technologies in acquisition, transmission and sharing of information. To accomplish it’s mission effectively and efficiently, NOAA will make appropriate use of Internet and Web technologies. NOAA seeks standard and easier ways to access increasingly complex technologies and information.

Implications:

Apply Principle	Do Not Apply Principle
NOAA uses the Web to acquire information from users.	NOAA fails to utilize the Internet or the Web to acquire information resulting in significant

Apply Principle	Do Not Apply Principle
	loss of efficiency. Information is acquired by means of paper or telephone with a corresponding increase of cost and lack of service to customers.
NOAA data and information is transmitted and shared on the Internet/Web, assuring it is available from a single authoritative source at all times to all people in a timely way.	NOAA's information is not easily located or utilized. Out of date printed data and information sources are inadequate and inconvenient.
Customers of NOAA data and information have web-based access available to everyone at any time.	NOAA customers have reduced access to data and information. NOAA data and information is available only by direct request requiring human intervention during business hours. Dissemination of information by reports or FAX results in multiple versions of information.

T.3. Electronic messaging is critical to NOAA's day-to-day business operations.

Rationale:

Messaging is critical to NOAA's day-to-day business operations. It must include a robust corporate directory and be reliable, accessible, and secure.

Implications:

Apply Principle	Do Not Apply Principle
NOAA day to day business operations are supported by robust, state of the art electronic messaging.	NOAA resources are wasted as communications are limited to older, less effective technologies.

T.4. Technologies will be chosen to support scalability and evolution.

Rationale:

Scalability, modularity and platform independence are critical elements of good programming practice in IT today. NOAA must adhere to these proven principles in it's application of IT.

Implications:

Apply Principle	Do Not Apply Principle
NOAA IT solutions are scalable, modular and platform neutral. Components can be expanded and reused with ease.	NOAA IT solutions are not cost effective. Changes in scale or platform require expensive redesign or retooling. New development is done from scratch and similar solutions must be developed repeatedly for use within different applications.

T.5. Emerging technologies will be evaluated in pilot projects before using them in critical and/or operational systems.

Rationale:

Rapid advances in Information Technology have already provided a solid basis for the effective accomplishment of NOAA's mission. In order to maintain a robust, high quality IT infrastructure that keeps pace with advances in information technology, NOAA must prototype emerging technologies in pilot projects in order to evaluate their applicability to NOAA problems. Technologies may be adopted if proven effective and efficient in pilot demonstrations.

Implications:

Apply Principle	Do Not Apply Principle
NOAA continues to achieve efficiencies of a robust and high quality IT infrastructure by evaluating promising emerging technologies in pilot projects.	NOAA avoids new technologies and operations are not improved by effective use of new technologies. NOAA wastes valuable resources by inappropriate application of "bleeding edge" technologies.

T.6. High Performance Computing will be used to meet NOAA's real and pressing needs for increased computing resources. Nancy (Scott Bittler broaden to other platforms, server platforms, application development)

Rationale:

Advances in IT require faster and more capable computing platforms across a broad spectrum of uses from the desktop to high performance computers required for modeling and forecasting. High Performance Computing will be used to meet NOAA's requirements for increased high-end computing resources for higher resolution models and for improved representation of the physics,

chemistry, and biology of environmental systems, and to help manage and process the rapidly increasing amounts of data available and necessary to run the models.

Implications:

Apply Principle	Do Not Apply Principle
Robust and high quality computing resources are available to meet NOAA needs.	NOAA's ability to provide services, such as weather forecasts, will suffer costly delays and inaccuracies stemming from inadequate computing resources. NOAA personnel will be unable to utilize modern software applications, from the desktop to sophisticated scientific applications, due to inadequate computing infrastructure. Quality of work, timeliness of results and workplace morale will suffer.